City University of Hong Kong
Course Syllabus

offered by School Energy and Environment
with effect from Semester A 2018/19

Part I Course Overview

Course Title:	Environmental Engineering Laboratory
Course Code:	SEE4002
Course Duration:	1 semester
Credit Units:	3 credits
Level:	B4
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	SEE1002 Introduction to Computing for Energy and Environment; SEE2002 Chemical Sciences for Energy and Environmental Engineers; SEE2003 Introduction to Energy and Environmental Data Analysis; SEE3101 Engineering Thermofluids II; SEE3203 Air Pollution; SEE4217 Waste and Wastewater Treatment Engineering; AND SEE4218 Water and Water Resource Engineering
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The course aims to impart practical skills to undergraduate students in bridging fundamental sciences and practical environmental engineering. Students are expected to assemble and/or apply basic scientific tools to measure properties of air, water and soil that are required in the design of infrastructure relevant to environmental engineering. Students are expected to develop proficiency in data processing, interpretation and statistical analyses.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Demonstrate the ability to construct and apply basic scientific tools for environmental measurements	-	✓	✓	
2.	Apply fundamental knowledge of science and statistical analyses to interpret various environmental measurements	-	✓	✓	
3.	Design systems or infrastructure related to environmental engineering based on the collected measurements	-		✓	✓
		100%			

** If weighting is assigned to CILOs, they should add up to 100%.*

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Lab-based experiments	Students are required to perform hands-on experimentation and data collection and interpretation. Based on the collected data, students are also required to engineer environmental system/infrastructures	✓	✓	✓	3

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.			Weighting*	Remarks
	1	2	3		
Continuous Assessment: __100__%					
Data analyses and report write-up	✓	✓	✓	100	Student will be denied the right to submit report if he/she fails to take part in the hands-on experimentation
Examination: __0__% (duration: N/A , if applicable)					
** The weightings should add up to 100%.*				100%	

Examination duration: N/A
Percentage of coursework, examination, etc.: 100% by coursework

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Data analyses and report write-up	1.1. Capacity to explain and analyse collected data	High	Significant	Moderate	Basic	Unsatisfactory
	1.2 Ability to design systems/infrastructure related to environmental engineering	High	Significant	Moderate	Basic	Unsatisfactory

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Aerosol measurements, air pollution, water quality analysis, wastewater treatment, solid waste treatment, data collection and statistical analysis

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Teaching materials of all the following courses:

- SEE2101 Engineering Thermofluids I
- SEE3101 Engineering Thermofluids II
- SEE2002 Chemical Sciences for Energy and Environmental Engineers
- SEE2003 Introduction to Energy and Environmental Data Analysis
- SEE4216 Air Pollution Measurement and Control
- SEE4217 Waste and Wastewater Treatment Engineering
- SEE4218 Water and Water Resource Engineering

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Fundamentals of Analytical Chemistry, 9th Edition, Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Brooks Cole Publishing, 2013
2.	Smoke, Dust, and Haze: Fundamentals of Aerosol Dynamics, 2nd edition, Sheldon K. Friedlander, Oxford University Press, 2000
3.	Air Pollution: Measurement, Modelling and Mitigation, 3rd edition, Abhishek Tiwary, Jeremy Colls, CRC Press, 2009
4.	Wastewater Engineering: Treatment and Reuse, 4th Edition, Metcalf & Eddy Inc., George Tchobanoglous, Franklin L Burton, H.David Stensel, McGraw Hill Higher Education, 2002
5.	Solid Waste Engineering, 2nd edition, William A. Worrell, P. Aarne Vesilind, CL Engineering, 2011
6.	Elements of Chemical Reaction Engineering, 5th Edition, H. Scott Fogler, Prentice Hall, 2016